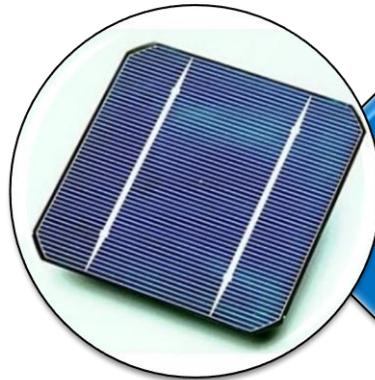


MANOHARBHAI PATEL INSTITUTE OF ENGINEERING & TECHNOLOGY, GONDIA



SOLAR BASED MOBILE CHARGER

Submitted By:
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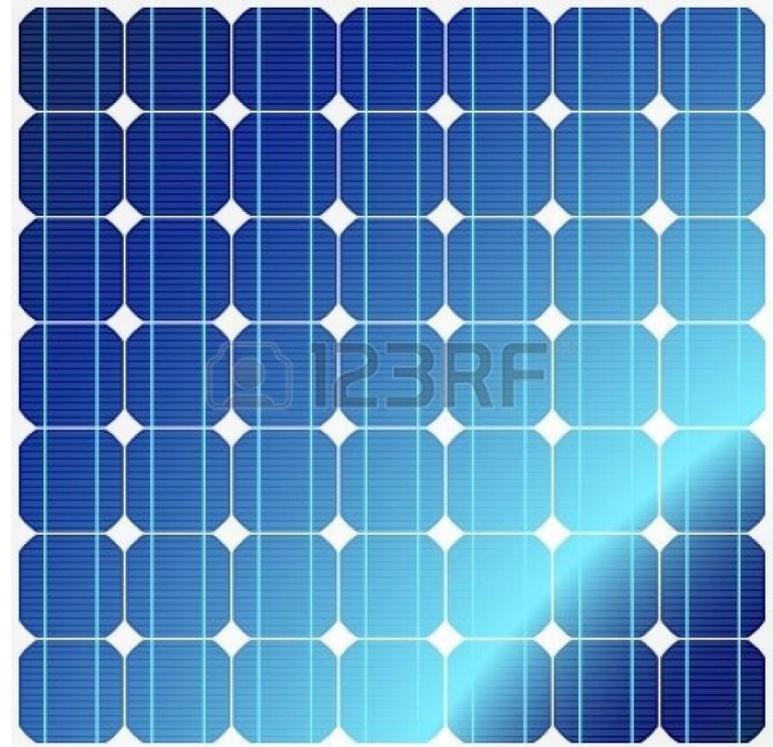
Guided By:
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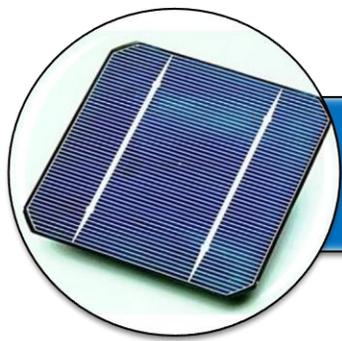
Solar panel



Introduction

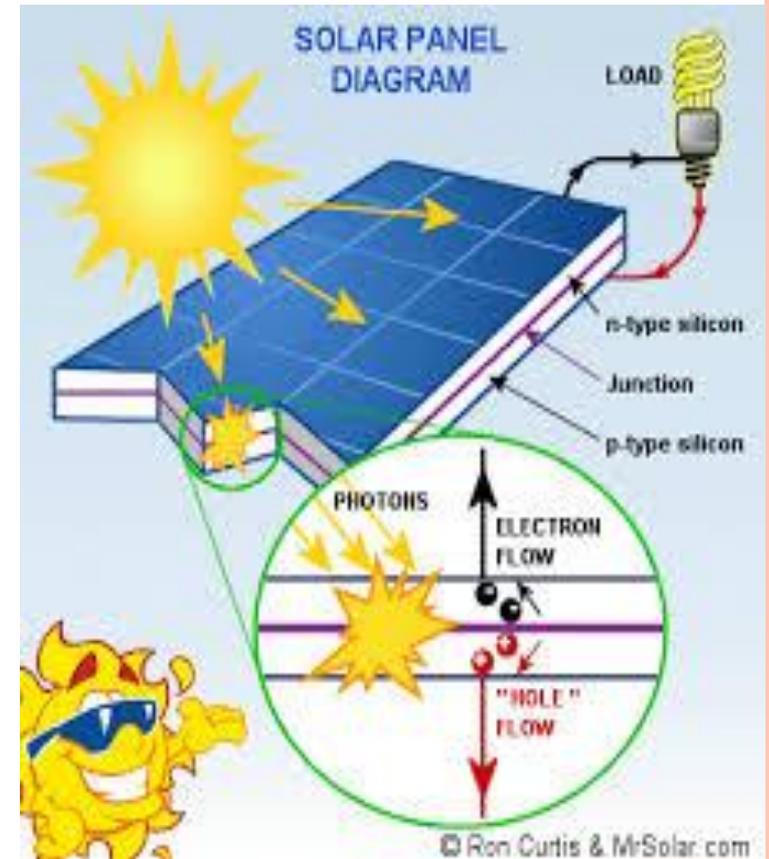
- The sun is a star made up of hydrogen and helium gas and it radiates an enormous amount of energy every second.
- Solar cell works on the principle of **photovoltaic effect**. Sunlight is composed of photons, or "packets" of energy.
- These photons contain various amounts of energy corresponding to the different wavelengths of light.
- When a photon is absorbed, the energy of the photon is transferred to an electron in an atom of the cell.





Solar Process

- Photovoltaic cells are made of special materials called semiconductors such as silicon. An atom of silicon has 14 electrons, arranged in three different shells.
- The outer shell has 4 electrons. Therefore a silicon atom will always look for ways to fill up its last shell, and to do this, it will share electrons with four nearby atoms. Now we use phosphorus (with 5 electrons in its outer shell). Therefore when it combines with silicon, one electron remains free.



- When energy is added to pure silicon it can cause a few electrons to break free of their bonds and leave their atoms. These are called **free carriers**, which move randomly around the crystalline lattice looking for holes to fall into and carrying an electrical current.
- However, there are so few, that they aren't very useful. But our impure silicon with phosphorous atoms takes a lot less energy to knock loose one of our "extra" electrons because they aren't tied up in a bond with any neighboring atoms. As a result, we have a lot more free carriers than we would have in pure silicon to become N-type silicon.
- The other part of a solar cell is doped with the element boron(with 3 electrons in its outer shell)to become P-type silicon.
- Now, when this two type of silicon interact, an electric field forms at the junction which prevents more electrons to move to P-side.
- When photon hits solar cell, its energy breaks apart electron-hole pairs. Each photon with enough energy will normally free exactly one electron, resulting in a free hole as well. If this happens close enough to the electric field, this causes disruption of electrical neutrality, and if we provide an external current path, electrons will flow through the P side to unite with holes that the electric field sent there, doing work for us along the way. The electron flow provides the **current**, and the cell's electric field causes a **voltage**.



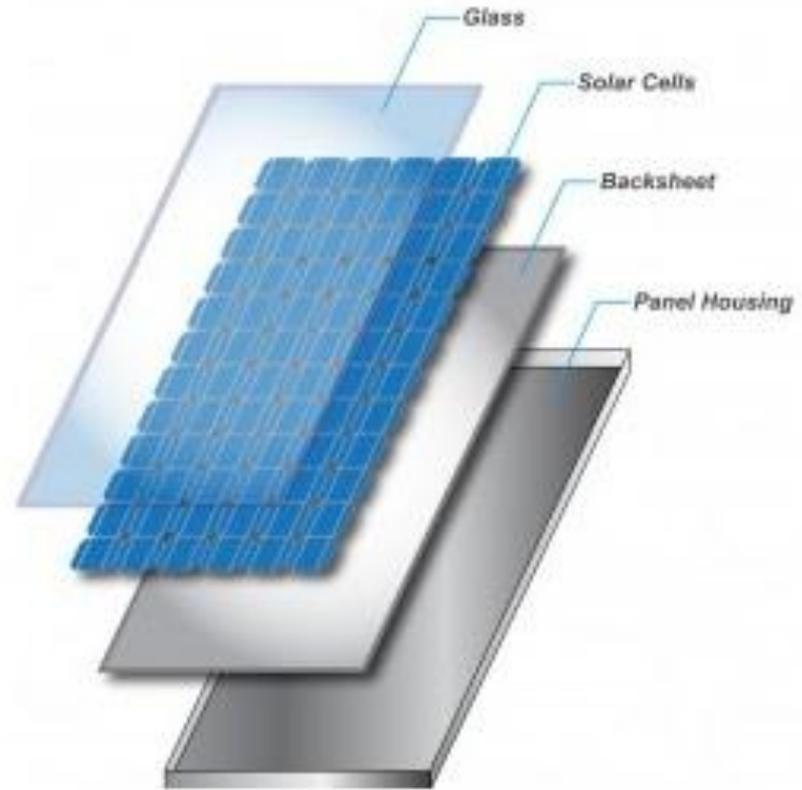
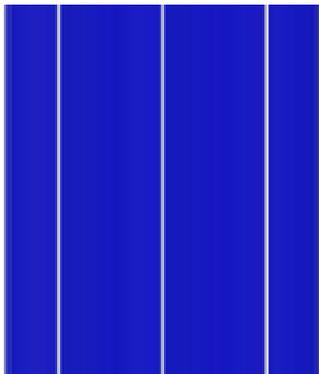


PV cell specification



POSITIVE

NEGATIVE

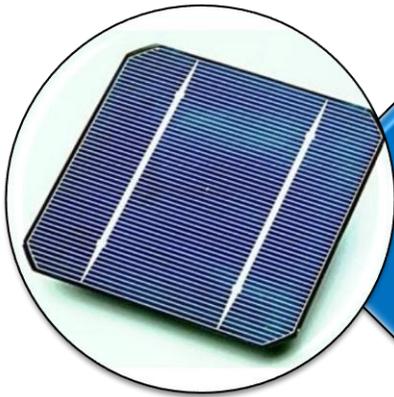




Specifications Of Charger

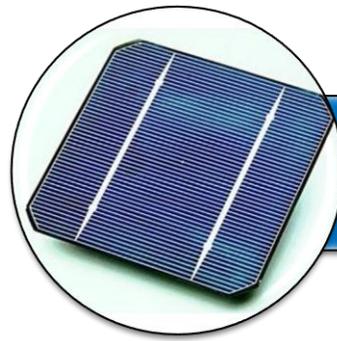
- Uses high-efficiency mono crystalline silicon.
- Solar panel: 5.5V/1000mA
- Output voltage: 5.5V
- Output current: 300-550 mA
- Time taken to charge mobile phone using the charger : about 60mintues for typical mobile.





BLOCK DIAGRAM

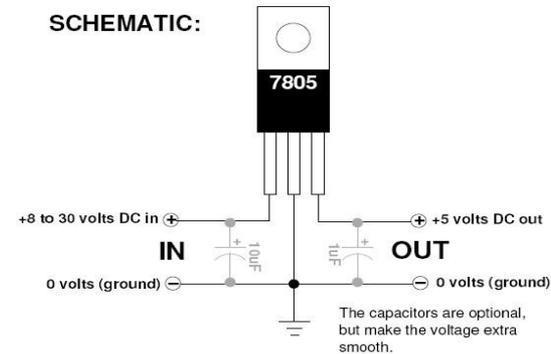




Solar Panel

- ❑ A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting structure. A photovoltaic module is a packaged, connected assembly of solar cells.
- ❑ The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications.
- ❑ A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and/or solar tracker and interconnection wiring.

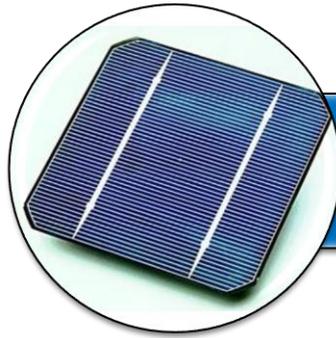




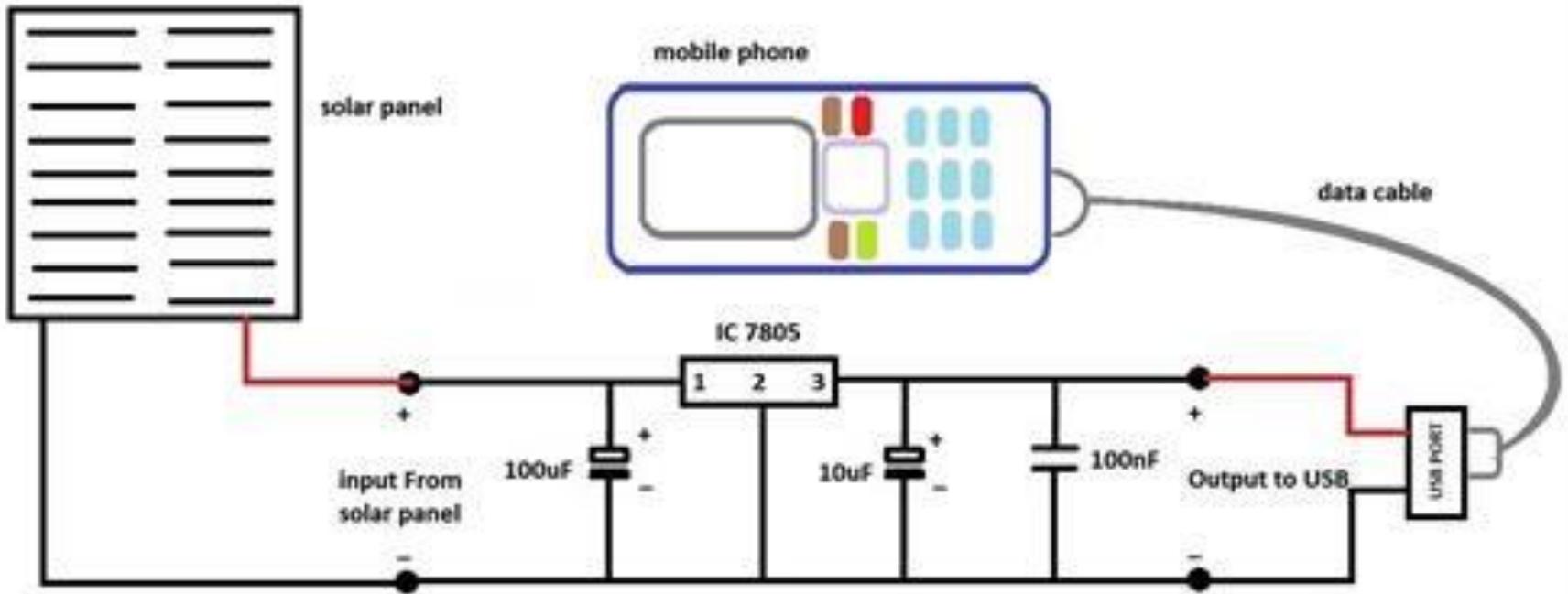
A 5V voltage regulator (7805) is used to ensure that no more than 5V is delivered to the Digi lab board

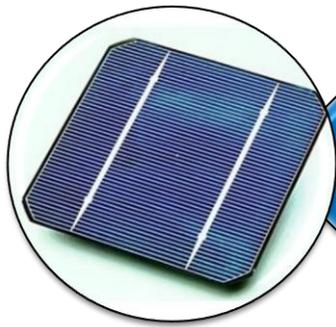
If a DC supply of greater than 12V is used, excessive heat will be generated, and the board may be damaged. If a DC supply of less than 5V is used, insufficient voltage will be present at the regulators output.

If a power supply provides a voltage higher than 7 or 8 volts, the regulator must dissipate significant heat.



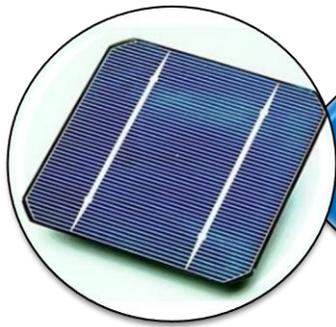
Circuit Diagram





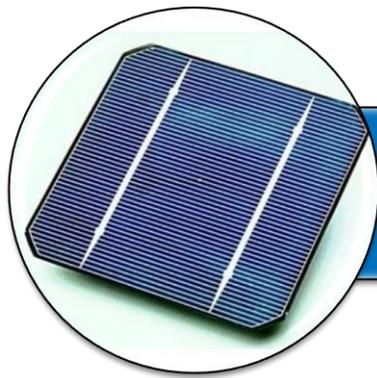
CIRCUIT WORKING

- ❑ The working of the circuit is simple. The output of the solar panel is fed via diode 1N5402 (D1), which acts as a polarity guard and protects the solar panel.
- ❑ An ammeter connected in series between diode D1 and fuse to measure the current flowing during charging of the batteries. As in fig., we have used analogue multi meter in 500Ma range.
- ❑ Diode D2 is used for protection against reverse polarity in case of wrong connection of the lead-acid battery. When you connect wrong polarity, the fuse will blow up.



CHARGING A MOBILE

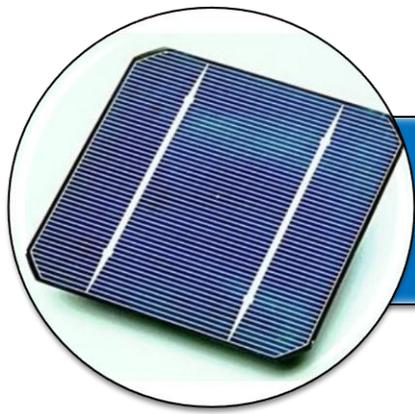




Advantages

- Solar energy is a renewable energy sources.
- Solar energy comes in free of charge.
- Solar cells panel on the solar charger does not require much maintenance.
- It also helps reduces cost such as electric bills as the solar charger source of energy is free.

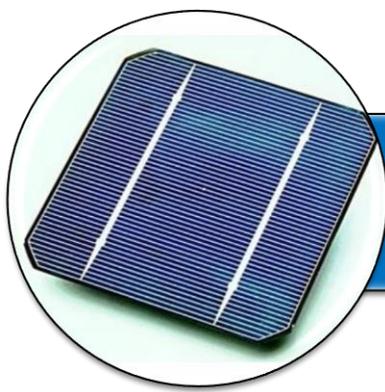




Disadvantages

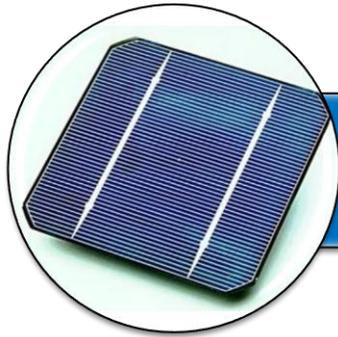
- Solar charger need light to work.
- Charging a device by solar charger is much slower than the main charger.





APPLICATION

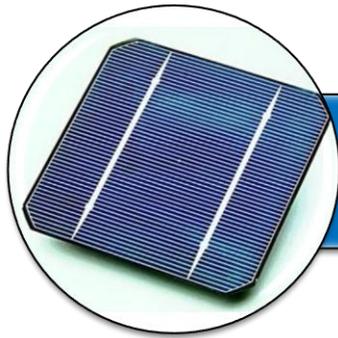
- For low-power portable electronics, like calculators or small fans, a photovoltaic array may be a reasonable energy source rather than a battery.
- Solar chargers can charge lead acid or Ni-Cd battery bank up to 48 V and hundreds of ampere-hours (up to 400 Ah) capacity.
- Small portable models designed to charge a range of different mobile phones, cell phones, iPods or other portable audio equipment.
- Public solar chargers permanently installed in public places, such as parks, squares and streets, which passersby can use for free.



Conclusion

- In solar mobile charger ripples will not be there as we use DC power directly to charge the mobile.
- Battery life is more as high voltages are not developed.
- Versatility of Solar mobile charger is high.
- Life of the battery will be high as we use solar mobile charger.
- Adaptability is high.





References

- Solar Electricity Engineering of Photovoltaic System, by Lorezo E.
- Power Electronics , by Bhimbra P.S.
- An Energy-aware Survey on Mobile-phone Chargers, p. 8. Bonner, J. (2012), Portable Solar Panel Charging Station, p.31.
- Renewable Energy and Energy Efficiency Incentives: A summary of Federal Programs, p.5. de Groot, H. (2008),





Thank
you

A close-up of a fountain pen's nib and barrel. The nib is gold and is positioned as if it has just finished writing the word 'you' in a black, elegant cursive script. The barrel of the pen is black with gold accents. On the barrel, the word 'silent' is written in white, with a small white star below it.